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R2 数学 本試

1 (1) $\frac{1}{\sqrt{3}} \div \left(-\frac{1}{2}\right)^2 - \sqrt{6} \times \frac{\sqrt{2}}{4} = \frac{1}{\sqrt{3}} \times 4 - \frac{2\sqrt{3}}{4} = \frac{4}{\sqrt{3}} - \frac{\sqrt{3}}{2}$

$= \frac{4\times 2 - \sqrt{3}\times\sqrt{3}}{2\sqrt{3}} = \frac{8-3}{2\sqrt{3}}$

$= \frac{5\sqrt{3}}{6}$

(2) $x^2 + ax - 6 = 0$

$(x+3)(x+\beta) = x^2 + (\beta+3)x + 3\beta$ ⇒ $x^2 + ax - 6 = x^2 + (\beta+3)x + 3\beta$

$\begin{cases} a = \beta + 3 & ① \\ -6 = 3\beta & ② \end{cases}$ $\beta = -2$ 　 $a = -2+3 = 1$ 　 $a = 1$

もう1つの解：2

(3) $y = -\frac{1}{4}x^2$ に

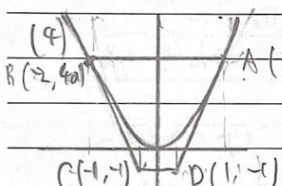
$x = -3$ 　 $y = -\frac{1}{4} \times (-3)^2 = -\frac{9}{4}$

を代入

$x = 7$ 　 $y = -\frac{1}{4} \times 7^2 = -\frac{49}{4}$

変化の割合は $\frac{-\frac{49}{4} + \frac{9}{4}}{7+3} = \frac{-40}{40} = -1$

(4)



$\frac{1}{2} \times (4+2) \times (4a+1) = 11$ 　 $4a + 1 = \frac{11}{3}$ 　 $4a = \frac{8}{3}$

$3(4a+1) = 11$

$a = \frac{2}{3}$

(5)

	1	2	3	4	5	6	
1	×	③	4	⑤	6	⑦	3
2	③		⑤	6	⑦	8	3
3	4	⑤		⑦	8	9	2
4	⑤	6	⑦		9	10	2
5	6	⑦	8	9		⑪	2
6	⑦	8	9	10	⑪		2

14 　 $\frac{14}{30} = \frac{7}{15}$

(6) 平均値 $x = \frac{1}{40}(2\times1 + 3\times2 + 4\times3 + 5\times4 + 6\times4 + 7\times6 + 8\times8 + 9\times10 + 10\times2) = 7$

中央値 $y = 7.5$

最頻値 $z = 9$ 　 $\therefore x < y < z$

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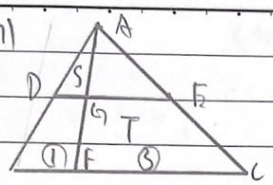
(7)

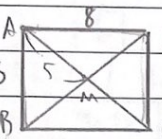


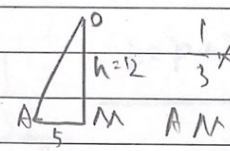
△ADG:△AGE=1:3

△AGE:△APC=1:4 ⇒ △AGE:四角形EGFC=1:3

∴ △ADG:四角形EGFC=1:9

(8)



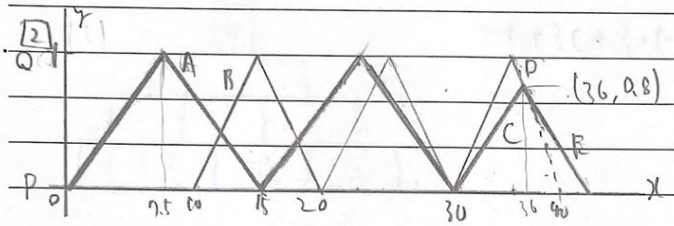


$\frac{1}{3}\times 6\times 8\times h=192$ $h=\frac{3\times 192}{6\times 8}=12$

$AM=\frac{1}{2}\sqrt{6^2+8^2}=5$

$AO=\sqrt{12^2+5^2}=13$ cm

(2)



(1) (A) $y=ax+b$ に $(7.5,1),(15,0)$ を代入

$\begin{cases} 1=7.5a+b & ① \\ 0=15a+b & ② \end{cases}$

①×2 $2=15a+2b$

② → ② $0=15a+b$

$2=b$ $b=2$

$b=2$ を②へ代入 $0=15a+2$ $a=-\frac{2}{15}$ $\therefore y=-\frac{2}{15}x+2$ (A)

(2) Bの線分の式を $y=ax+b$ とおき, $(10,0),(15,1)$ を代入

$\begin{cases} 0=10a+b & ① \\ 1=15a+b & ② \end{cases}$

②−① $1=5a$ $a=\frac{1}{5}$

$a=\frac{1}{5}$ を①へ代入 $0=10\times\frac{1}{5}+b$ $b=-2$ $\therefore y=\frac{1}{5}x-2$ (B)

(A)と(B)を連立すると

$-\frac{2}{15}x+2=\frac{1}{5}x-2$

$-2x+30=3x-30$

$5x=60$ $x=12$

$x=12$ を(B)へ代入 $y=0.5\times 12-2=2.4-2=0.4$ km

(3) (C) $y=\frac{2}{15}(x-30)=\frac{2}{15}x-4$ → $\frac{2}{15}x-4=-\frac{1}{5}x+8$ $y=-\frac{1}{5}(36-40)=\frac{4}{5}$

(D) $y=-\frac{1}{5}(x-40)=-\frac{1}{5}x+8$ 連立

$2x-60=-3x+120$

$5x=180$ $x=36$ $(x,y)=(36,0.8)$

(E) $y=-\frac{2}{15}(x-c)$ に $(36,0.8)$ を代入 $\frac{4}{5}=-\frac{2}{15}(36-c)$ $c=36+6=42$ 分

(4) $1\times 4+0.8\times 2=5.6$ km

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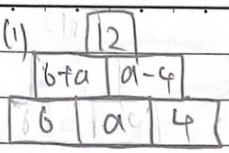
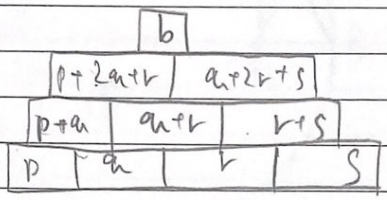
3 (1)



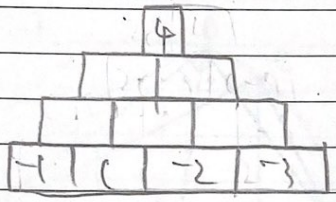
$6+a+a-4=12$

$2a=10$

$a=5$



$b=p+3q+3r+s$

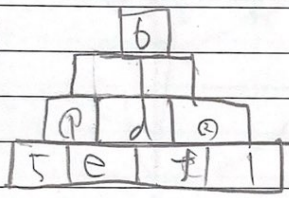


$-1+3c+3\times(-2)+3=4$

$3c=14$

$c=\frac{14}{3}$

(2)



$5+3e+3f+1=b$

$3e+3f=0$

$f=-e$

$\therefore d=e-e=0$

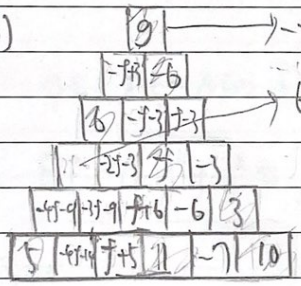
$-6 \leqq e \leqq 6$

① $5+e \leqq 6 \Rightarrow e \leqq 1$

② $-e+1 \leqq b \Rightarrow e \geqq -5$

$\therefore -5 \leqq e \leqq 1 \Rightarrow$ 7個

(3)



$-f+3-6=g$

$6+2f+3=-7f-18$

$\begin{cases} f+g=-3 \\ 9f=-27 \end{cases}$ $f=-3$ → $-3+g=-3$ $g=0$

$\therefore (f,g)=(-3,0)$

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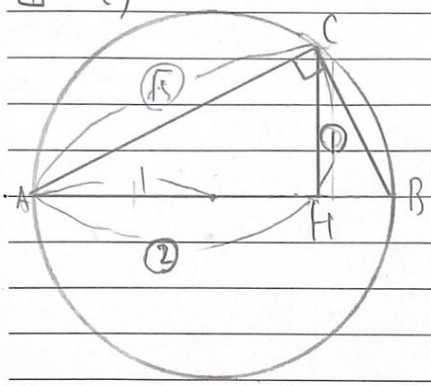
4 (1)



CH=xとおく

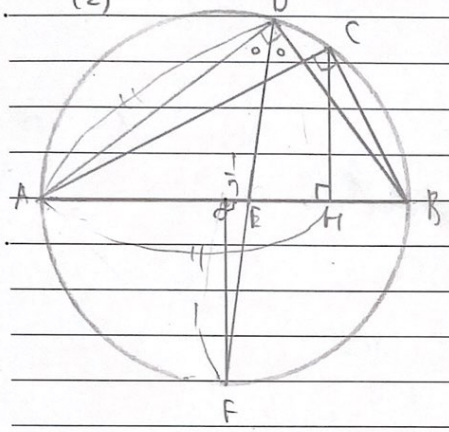
AH:AC=AC:AB

$2x : \sqrt{5}x = \sqrt{5}x : 2$

$5x^2 = 4x$

$x = \frac{4}{5}$ ∴ $AH = 2x = \frac{8}{5}$

(2)



∠ADB=90° PY ∠ADB=45°

~~$DB = \sqrt{AB^2 - AD^2} = \sqrt{AB^2 - AH^2}$~~

$= \sqrt{2^2 - \left(\frac{8}{5}\right)^2} = \sqrt{\frac{100}{25} - \frac{64}{25}} = \sqrt{\frac{36}{25}} = \frac{6}{5}$

△DABにおいて

$AE : BE = AD : BD = \frac{8}{5} : \frac{6}{5} = 4 : 3$

∴ $AE = \frac{4}{7}AB = \frac{4}{7} \times 2 = \frac{8}{7}$

(3) $OE = AE - AO = \frac{8}{7} - 1 = \frac{1}{7}$, $OF = 1$ PY

$EF = \sqrt{\left(\frac{1}{7}\right)^2 + 1^2} = \sqrt{\frac{1}{49} + 1} = \sqrt{\frac{50}{49}} = \frac{5\sqrt{2}}{7}$